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FIG. 7.—Longitudinal section through the optic ganglion and the eye; × 50 diameters.

FIG. 8.—Longitudinal section through the brain, showing the calyx, antennal lobes, and commissural lobes; × 50 diameters.

FIG. 8 *a*.—Enlarged view of Fig. 8 (× ½ B.), showing the relations in a longitudinal section of the calyx to the stalk, although the direct connection of the stalk with the calyx is not seen in this section.

DESCRIPTION OF PLATE III.

FIG. 1.—Section 19 (× ½ A), passing through the back of the brain, showing the posterior edge of the calices and antennal lobes and œsophageal commissural nerves and optic nerve. *tr.*, small tracheæ.

FIG. 2.—Section 20, passing through the back of the brain, showing the relation of the optic nerve to the optic ganglion and eye; the cornea, cones, rods and retina of the eye are shown; × ½ A. *sup. n.*, superior, *m. n.*, median, and *inf. n.*, inferior commissural nerves connecting the hemispheres.

FIG. 3.—Enlarged view of upper part of the stalk and calyx, and the ganglion cells surrounding and filling the latter; × 225 diameters. 3 *a*, *b*, *c*, *d*, different ganglion cells seen from different directions, 3 *c* showing the large nucleus filled with coarse granules, but showing no nucleolus; one, however, is seen in Fig. 3 *b*. *ncl.*; × 725 diameters.

FIG. 4.—Longitudinal section of the brain and subœsophageal ganglion, magnified 50 diameters, showing the relations between the two, and of the origin of the œsophageal commissure from the upper side of each ganglion, *i. e.*, from the back of the brain and the upper side of the subœsophageal ganglion.

FIG. 5.—Enlarged view (× ½ B) of the subœsophageal ganglion of Fig. 6, Pl. x, showing the origin of the commissure to the first thoracic ganglion, and on the under side the three lobes (mandibular, maxillary, and labial), whence the nerves are sent to the mouth-appendages. *mand. l.*, mandibular lobe; *max. l.*, maxillary, and *max. l'.*, 2d maxillary or labial lobe; *com.*, commissure to subœsophageal ganglion.

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EDITORS' TABLE.

EDITORS: A. S. PACKARD, JR., AND E. D. COPE.

—— The day is probably not distant when government aid for the protection of agriculturists against injurious plants and animals will be demanded as urgently as for geological, coast and land surveys. Let us glance briefly at the reasons why such aid becomes imperative. Until within three years no special attention had been given by Congress to these subjects; what little had been done by the botanist and entomologist connected with the Department of Agriculture being, from causes beyond their control, too slight to be worthy of mention. What had been done by the Government was much less than the efforts of several States, notably New York, Missouri and Illinois; these States having appropriated sums amounting from $15,000 to $30,000 for the investigation of injurious insects, with results of the greatest and most obvious importance.

Until the formation in 1877 of the U. S. Entomological Commission, not a dollar was ever appropriated by the General Government for the investigation by experts of injurious insects, nor for the study of the rust, smut, mildew and other injurious fungi by which millions of dollars are lost to agriculture. About a year after the establishment of the commission, Professor Riley, the chief of the commission, was appointed Entomologist to the Department of Agriculture, and during the short time he held the position, by his personal efforts obtained from Congress a special appropriation of $5000 to place his Division upon a more practical basis, and also another appropriation of $5000 for the investigation of the cotton worm. The readiness with which these appropriations were granted, shows that Congress appreciates capable effort in applied entomology. The first-mentioned appropriation has since been made annually to the Department, while others have also been made for continuing the cotton worm investigation under the direction of the U. S. Entomological Commission. These appropriations were the immediate result of the labors and example of this Commission and not of the Agricultural Department itself.

Under the Interior Department, from small beginnings, a large and growing branch of applied Zoölogy has grown under the care and unremitting toil of Professor Baird. We refer to the Commission of Fish and Fisheries. Ten years ago the depleted fisheries of the Atlantic coast and the local disputes of the fishermen attracted the attention of Congress, and Professor Baird was appointed a Commissioner to investigate the causes. The first appropriation was $5000, we believe; the one last year ungrudgingly voted by Congress was about $140,000 in the aggregate. It is needless to state that the practical results of these investigations have been immediate and many-fold the amounts appropriated, and the benefits conferred on American biology enormous. It should be said that the value of our fisheries by the census of 1870 was only $11,096,522, though the estimate is only approximative and imperfect.

Turning to our geological surveys; within the last twenty-five years sums aggregating several millions of dollars, in some years over $200,000 per annum, have been wisely appropriated by Congress for the surveys of the public domain. Owing to the fostering spirit shown by Government, American geology stands preëminent, and ranks as high as in the governments of Europe; and yet compared with the agricultural products of the country, the mineral products of the United States are inconsiderable. By the census of 1870 the mineral products of this country amounted to $152,598, 994. This amount is only approximative, as it was impossible to obtain exact returns. But it will be seen that for the interests involved, the Government has been liberal in its appropriations for geological investigations, and it will be the best economy to be still more liberal than in the past.

How much has the General Government expended for our national agriculture, whose products amounted, in 1870, to $2,447,538,658, the returns being in the nature of things far more reliable and exact than in the other departments enumerated? We would answer emphatically that beyond laying out the agricultural grounds and erecting the Department building at Washington, distributing seeds (the larger share of which were of the commonest kinds of flowers and vegetables obtained at bargains of seedsmen), the amounts voted by the Government in this direction have not, in the opinion of agricultural experts, or of others well qualified to judge, been at all commensurate with what ought or should have been voted. We do not deny that considerable good has been accomplished by the Agricultural Department, especially of late, in agricultural chemistry and animal diseases. But absolutely nothing has been accomplished in building up those branches of applied science related to agriculture, in creating trained experts, in the issue of scientific and authoritative reports, bulletins and manuals, in obtaining the coöperation and counsels of experts in different parts of the country, all working together for the benefit of a scientific, or in other words common-sense agriculture.

We would ask if the time is not coming for a practical biological survey of the United States commensurate with the immense interests involved, and on a scale analogous to the geological and coast surveys and the signal bureau? At least cannot a slight beginning be made in this direction?

The average annual loss to the nation from the attacks of injurious plants and insects and other animals, amounts at a moderate calculation to $300,000,000. A large proportion of this loss or waste could, by human means, be saved and added to the national capital. Within a period of four years a few of the Western States suffered a loss of $200,000,000, by the attacks of the Rocky mountain locust. The State of Illinois lost in one year (1864) $73,000,000 by the chinch bug; the annual average loss to the cotton crop is estimated at not less than $15,000,000 or $20,000,000. Such figures and estimates could be multiplied.

With a proper reorganization or enlargement of the Agricultural Department, under the direction of a commissioner of intelligence and scientific attainments, these scientific investigations might be begun and carried on, or if this department is hopelessly fated to go on as in the past, the work might be superintended by the Smithsonian Institution, if not carried on under the Interior Department. However this may be, there is urgent need of intelligent extended botanical and entomological investigations. In time, appropriations for such work would not be needed: the Government need only to foster such investigations, give them a start, and when the work is well advanced, leave it to State and individual action. We leave to another occasion the needs of an investigation of disease-germs, plant-fungi, in connection with rust, smut and mildew, and of cattle diseases, and would say a word in reference to applied entomology. This work cannot be done by one or several entomologists confined the year around to the Agricultural Department at Washington, where there are no extensive field or garden crops and forests. There might be formed a national board of entomologists, who should investigate cotton, wheat and corn insects, those infesting field and grass crops, and our forest and shade trees. They should not all be required to live at Washington, but work where the material is at hand; they should, therefore, divide the subject among themselves, prepare special bulletins, final reports and manuals for the diffusion of a genuine knowledge of insects, of which there are probably from 50,000 to 100,000 species on this continent. Such work would, we believe, do an immense deal towards multiplying local observers, diffusing a knowledge of applied and scientific entomology among the masses, would develop the teaching of useful natural knowledge in the common schools, increase the number of scientific entomologists and general biologists, and would eventually place the sciences of botany and zoölogy upon the same level which they hold in other countries, and in the end add immensely to the natural resources of our soil and increase our national wealth.

—— The Academy of Natural Sciences of this city, has filled two more of the chairs, which it created four years ago, with competent professors. The two courses of lectures, on invertebrate palæontology, and mineralogy and stratigraphic geology, are an important acquisition to the educational facilities of the city, and will also serve to strengthen the scientific back-bone of the Academy. The institution is to be congratulated on having made such an important advance, and in having given such merited recognition to Messrs. Heilprin and Lewis.

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RECENT LITERATURE.

WALLACE'S ISLAND LIFE.[1]—After the publication of his work entitled, "The Geographical Distribution of Animals," Mr. Wallace devoted four years' additional thought and research in

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[1] *Island Life or the Phenomena and Causes of Insular Faunas and Floras,* including a Revision and attempted solution of the Problem of Geological Climates. By ALFRED RUSSELL WALLACE. New York, Harper & Brothers, 1881. 8vo, pp. 522.